

Appln. No.: 10/601,939
Amendment Dated September 14, 2005
Reply to Office Action of June 22, 2005

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Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. - 6. (Canceled)

7. (Previously Presented) A composition for treating the surface of a ferrous metal, the composition comprising:

- a) at least one of aluminum sulfate and an aluminum sulfate precursor;
- b) at least one of boric acid and a boric acid precursor;
- c) at least one of a polycarboxylic acid and a polycarboxylic acid precursor selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, a precursor of any of these, and mixtures of any of these; and
- d) a polyol comprising at least one of trimethylolpropane, pentaerythritol, and dipentaerythritol.

8. (Previously Presented) The composition of claim 7, wherein said polyol comprises at least one of trimethylolpropane and pentaerythritol.

9. and 10. (Canceled)

11. (Previously Presented) A composition for treating the surface of a ferrous metal, the composition comprising:

- a) between about 40 wt.% and about 80 wt.% of aluminum sulfate;
- b) between about 10 wt.% and about 20 wt.% total of at least one of boric acid and a boric acid precursor; and
- c) between about 10 wt.% and about 20 wt.% total of at least one of a polycarboxylic acid and a polycarboxylic acid precursor selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, a precursor of any of these, and mixtures of any of these.

12. (Previously Presented) The composition of claim 11 wherein said at least one of a polycarboxylic acid and a polycarboxylic acid precursor is selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, azelaic acid, a precursor of any of these, and mixtures of any of these, the composition further comprising:

- d) between about 5 wt.% and about 10 wt.% of citric acid;
- e) between about 2 wt.% and about 5 wt.% of pentaerythritol;
- f) between about 2 wt.% and about 5 wt.% of adipic acid; and
- g) between about 1 wt.% and about 3 wt.% of L-aspartic acid.

13. (Original) A composition for treating the surface of a ferrous metal, the composition comprising:

- a) between about 50 wt.% and about 70 wt.% of aluminum sulfate;
- b) between about 10 wt.% and about 15 wt.% of boric acid;
- c) between about 5 wt.% and about 15 wt.% of oxalic acid;
- d) between about 2 wt.% and about 7 wt.% of citric acid;
- e) between about 2 wt.% and about 7 wt.% of adipic acid;
- f) between about 1 wt.% and about 5 wt.% of pentaerythritol;

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- g) between about 1 wt.% and about 5 wt.% of trimethylolpropane;
- h) between about 0.5 wt.% and about 2 wt.% of azelaic acid; and
- i) between about 1 wt.% and about 5 wt.% of L-aspartic acid, D-aspartic acid, or a mixture thereof.

14. - 18. (Canceled)

19. (Previously Presented) A method for treating the surface of a ferrous metal, comprising contacting the surface of a ferrous metal with an aqueous mixture comprising:

- a) aluminum sulfate;
- b) boric acid; and
- c) a polycarboxylic acid selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, and mixtures of any of these, wherein said ferrous metal is a low-carbon steel, and wherein the contacting step comprises contacting the surface of the ferrous metal with the aqueous mixture at a temperature between about 185°F and about 200°F.

20. (Previously Presented) A method for treating the surface of a ferrous metal, comprising contacting the surface of a ferrous metal with an aqueous mixture comprising:

- a) aluminum sulfate;
- b) boric acid; and
- c) a polycarboxylic acid selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, and mixtures of any of these, wherein said ferrous metal is a medium-carbon steel, and wherein the contacting step comprises contacting the surface of the ferrous metal with the aqueous mixture at a temperature between about 170°F and about 200°F.

21. (Canceled)

22. (Previously Presented) A method for treating the surface of a ferrous metal, comprising contacting the surface of a ferrous metal with an aqueous mixture comprising:

- a) aluminum sulfate;
- b) boric acid; and
- c) a polycarboxylic acid selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, and mixtures of any of these, wherein said polycarboxylic acid is selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, and mixtures of any of these, the aqueous mixture further comprising at least one of L-aspartic acid and D-aspartic acid.

23. - 24. (Canceled)

25. (Previously Presented) A method for treating the surface of a ferrous metal, comprising contacting the surface of a ferrous metal with an aqueous mixture comprising:

- a) aluminum sulfate;
- b) boric acid; and
- c) a polycarboxylic acid selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, and mixtures of any of these, wherein said polycarboxylic acid is selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, citric acid, aspartic acid,

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glutamic acid, and mixtures of any of these, the aqueous mixture further comprising at least one of adipic acid and azelaic acid.

26. - 33. (Canceled)

34. (Previously Presented) An aqueous mixture for treating the surface of a ferrous metal, the mixture comprising:

- a) aluminum sulfate;
- b) boric acid;
- c) citric acid; and
- d) a polyol comprising at least one of trimethylolpropane, pentaerythritol, and dipentaerythritol.

35. (Previously Presented) The aqueous mixture of claim 34, wherein said polyol comprises at least one of trimethylolpropane and pentaerythritol.

36. and 37. (Canceled)

38. (Previously Presented) An aqueous mixture for treating the surface of a ferrous metal, the mixture comprising a composition comprising:

- a) between about 40 wt.% and about 80 wt.% of aluminum sulfate;
- b) between about 10 wt.% and about 20 wt.% of boric acid; and
- c) between about 10 wt.% and about 20 wt.% total of a polycarboxylic acid selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, citric acid, aspartic acid, glutamic acid, and mixtures of any of these.

39. (Previously Presented) The aqueous mixture of claim 38 wherein the polycarboxylic acid is selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, azelaic acid, and mixtures of any of these, the composition further comprising:

- d) between about 5 wt.% and about 10 wt.% of citric acid;
- e) between about 2 wt.% and about 5 wt.% of pentaerythritol;
- f) between about 2 wt.% and about 5 wt.% of adipic acid; and
- g) between about 1 wt.% and about 3 wt.% of L-aspartic acid.

40. (Original) An aqueous mixture for treating the surface of a ferrous metal, the composition comprising the following materials in the following relative amounts, exclusive of added water:

- a) between about 50 wt.% and about 70 wt.% of aluminum sulfate;
- b) between about 10 wt.% and about 15 wt.% of boric acid;
- c) between about 5 wt.% and about 15 wt.% of oxalic acid;
- d) between about 2 wt.% and about 7 wt.% of citric acid;
- e) between about 2 wt.% and about 7 wt.% of adipic acid;
- f) between about 1 wt.% and about 5 wt.% of pentaerythritol;
- g) between about 1 wt.% and about 5 wt.% of trimethylolpropane;
- h) between about 0.5 wt.% and about 2 wt.% of azelaic acid; and
- i) between about 1 wt.% and about 5 wt.% of L-aspartic acid, D-aspartic acid, or a mixture thereof.

41. - 42. (Canceled)

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43. (New) The composition according to claim 11, wherein the polycarboxylic acid is a mixture of oxalic acid and citric acid.
44. (New) The method according to claim 19, wherein the polycarboxylic acid is a mixture of oxalic acid and citric acid.
45. (New) The method according to claim 20, wherein the polycarboxylic acid is a mixture of oxalic acid and citric acid.
46. (New) The aqueous mixture according to claim 38, wherein the polycarboxylic acid is a mixture of oxalic acid and citric acid.